Biochemistry

التاريخ / / | الموضوع Lecture (2)

أهمية

Importance of Monosaccharides:-

(1) D-Glucose (an aldohexose $C_6H_{12}O_6$):-

from Greek word (glukus) ← (sweet)

الاسم

1 → Name:- 1-Glucose, 2-Dexterose, 3-Blood sugar, 4-Grape sugar.

الموجود

2 → Source:- it is present in honey and milk.

3 → Importance:- 1- it's a major source of energy in human body

الأهمية

2- it's the sole source of energy for brain and red blood cells.

(2) D-fructose (Ketohexose $C_6H_{12}O_6$):-

← the most (sweetest) Monosaccharides

1 → Name:- 1-fructose, 2-levulose, fruit sugar.

2 → Source:- Honey and milk.

3 → Importance:- ①- Major (main) sugar of semen which is used by sperms as energy source.

②-also can be used as energy source for humans

(3) D-Galactose:- ($C_6H_{12}O_6$).

Galact → (milk)

1 → Name:- Galactose.

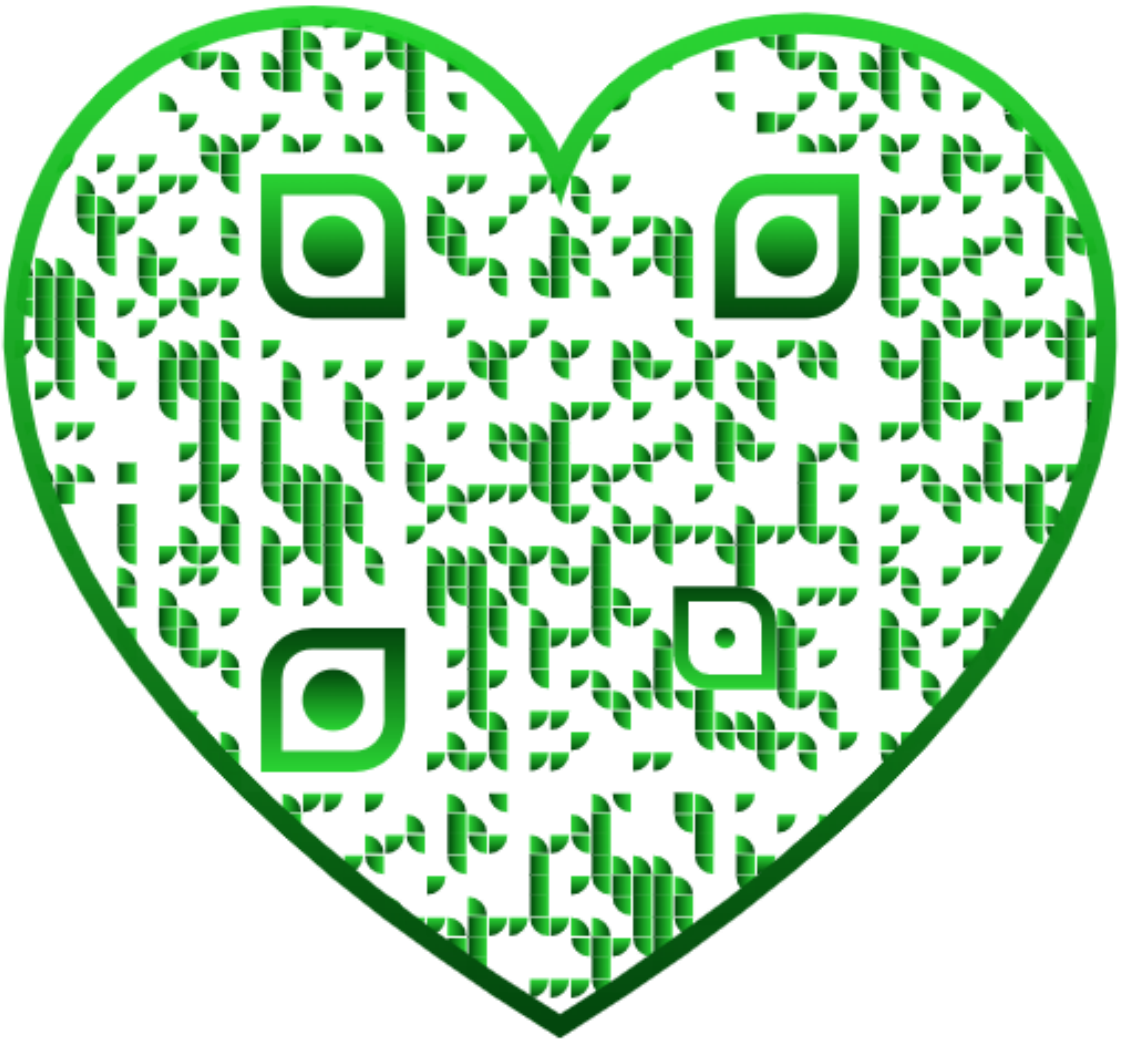
خصائص

2 → properties:- Not found free in nature. لا توجد بالطبيعة

3 → Source:- Dairy product (milk).

4 → Importance:- ①- Component of lactose in milk.

② and as Component of glycoproteins and Compound lipid.



(4) D- Ribose :-

1- Name :- Ribose.

2- Importance :- enters in the structure (backbone) of nucleic acid RNA and some coenzymes.

example :- * FAD (Vitamin B_2)
* NADH (Vitamin B_3)
* ATp, and coenzyme A (Vitamin B_5).

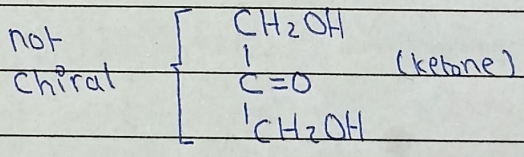
* Properties of monosaccharides :-

1- All monosaccharides are : 1- Soluble (ذائبة), Crystaline (بلورات), unaffected by digestive enzymes (لا تتأثر بالأنزيمات الهاضمة).

2- All monosaccharides have one asymmetric (Chiral) carbon (كربون مرتبط بأربع ذرات مختلفة) or more except : dihydroxy acetone

↓

not Chiral



3- Optical activity.

* **Diasaccharides:** are O-glycosides which are composed of (two monosaccharides).

يعالج الإمساك

(Diatery fibers) ألياف غذائية ← ملاحظة:
- اي سكر لا يهضم في الجسم ←
- اي سكر يهضم في الجسم ← يعطي طاقة (Energy)

(Diatery fibers): non digestible diasaccharide ← ملاحظة:
↳ (Laxative): to treat constipation and prevent Cholesterol.
مسهل يعالج الإمساك ويمنع الكلسترول

* **Nomencluture of glycosidic bond between sugars:**
read page (32) <<<

* **Examples of the most important diasaccharides:**
1. lactose (milk sugar).
2. Maltose (malt sugar).
3. Sucrose (Sugar cane, beet sugar, table sugar)
4. lactulose (Synthetic diasaccharides).
5. Trehalose.

الموضوع

التاريخ / /

أهمية
* Important disaccharides :-

(1)- lactose (milk sugar) :- => less sweet sugar.

1 → it is found in (milk).

2 → it's the best food for infants [because] :-
↳ it is the least sweet sugar so that the baby can drink a large amount of mother's milk without loss of appetite.

مكونات
3 → Composition :- Consist of β-D-galactose (1) and β-D-glucose (2).

خصائص
4 → properties :- (due to free anomeric carbon in glucose residue).
1- Present α and β form. (لأن الدهيد حر)
2- Undergoes mutarotation. (إنزياح بالضوء لـ α أو β)
3- it is reducing sugar (سكر يحول محلول النحاس من أزرق ← أحمر)
4- it can form characteristic osazone crystal [cotton ball shape]

* ملاحظات :-

(1) Anomeric carbon :- aldehyde or ketone present in sugar.
← الدهيد أو كيتون موجود في السكر

(2) Any sugar that contain (free aldehyde or ketone) are called :- free anomeric carbon acquires properties and advantages, and vice versa.
أي سكر يحتوي على الدهيد أو كيتون (حر) يكتسب خصائص أو مميزات والعكس صحيح

سكر الشعير

(2) Maltose (Malt Sugar):-

تتكون اثناء هضم النشأ

1 → it is produced during digestion of Starch

2 → it does not exist in nature. (galactose) :- مثل لا توجد بالطبيعة

3 → Composition (Component) :- Consist of two molecules of (α-D-Glucose)

4 → properties :- خصائص

⇓

① present in α and β form.

② undergoes mutarotation.

③ reducing sugar.

④ Can form characteristic osazone crystal (Rosette Shape) النشأ

(Cotton ball) crystal ← [نفس خصائص الـ lactose ولكن الأختلاف في شكل البلورات] :- Note

Isomaltose :-

↳ Disaccharide Similar to [Maltose], but :-
the linkage α-(1-6) glycoside bond instead of α-(1-4) glycoside.

⇒ produced :- during digestion of Starch and glycogen by (α-amylase).

(سكر القصب)

(3)- Sucrose (Cane sugar, beat sugar, table sugar):-

السكروز هو السكر الذي يعتمد عليه بشكل (الأكثر استخداما)

1 → Most abundant disaccharides in nature. أكثر سكر ثنائي متوفر في الطبيعة

2 → found in:- (Sugar cane, beet sugar, & some fruits)

3 → Composition (component):- Consist of α-D-Glucose and β-D-Fructose.

4 → properties:-

Sucrose does not contain free anomeric carbon because the anomeric carbon of both α-D-glucose (C_1) and β-D-Fructose (C_2) units are involved in formation of the glycoside bond.

ملاحظة:-
السكروز لا يحتوي على كيتون أو الدهيد (حر) ← Free
وخصائص السكر التابع للـ Surrose يكون عكس الـ lactose و maltose

(properties)

* Properties:-

1) it can't form α and β form.
2) Does not undergo Mutarotation.
3) it's non reducing sugar → لأنه مش حر
لا تتغير النحاس إلى أحمر (يظل أزرق) لأنه مش حر
4) it can not form Crystal.